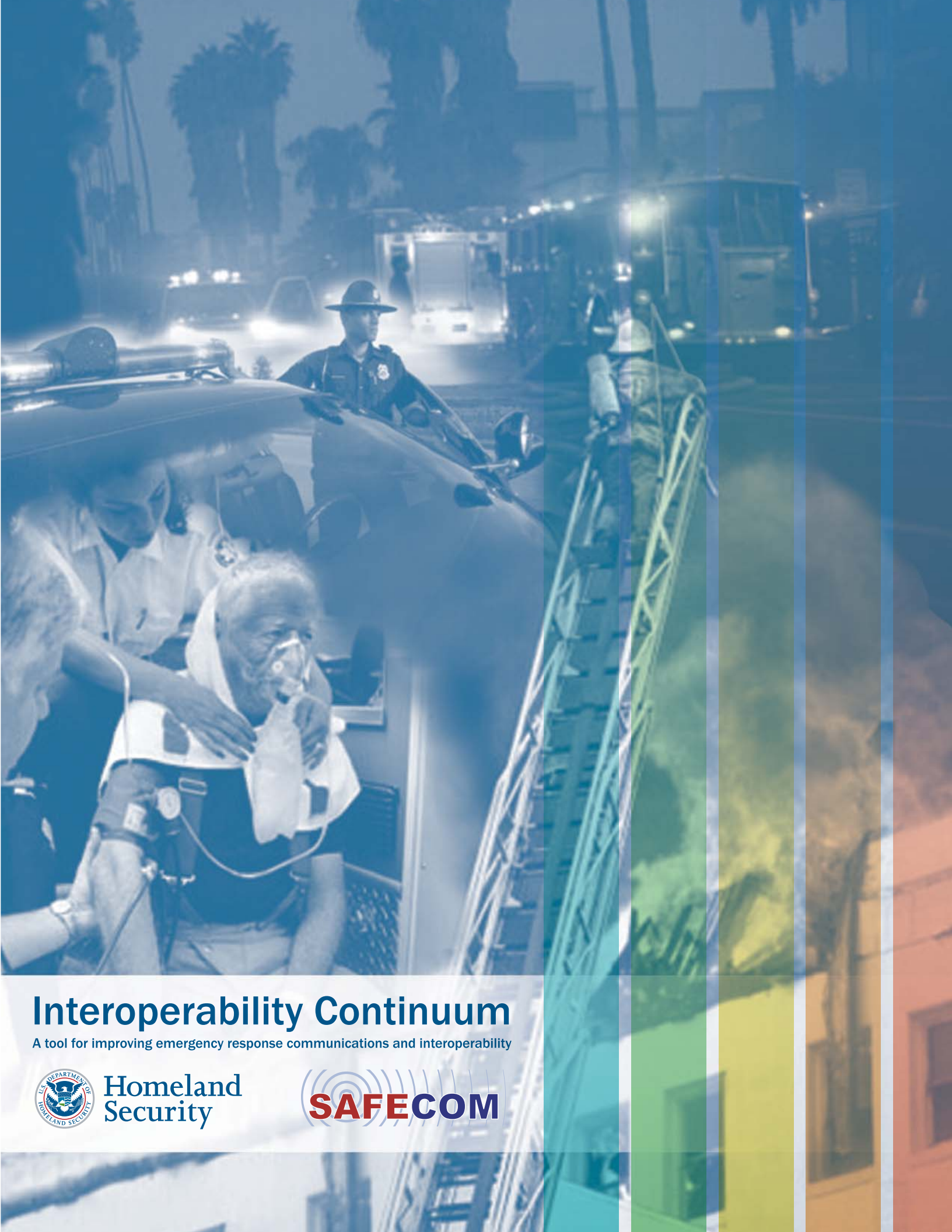

Interoperability Continuum

A tool for improving emergency response communications and interoperability

Homeland Security

SAFECOM

Interoperability Overview

This Interoperability Continuum is designed to help the emergency response community and local, tribal, state, and Federal policy makers address critical elements for success as they plan and implement interoperability solutions. These elements include governance, standard operating procedures, technology, training and exercises, and usage of interoperable communications.

The Interoperability Continuum was developed in accordance with the SAFECOM program's locally driven philosophy and its practical experience in working with local governments across the Nation. SAFECOM is a communications program of the Department of Homeland Security's Office for Interoperability and Compatibility. The Continuum was established to depict the core facets of interoperability according to the stated needs and challenges of the emergency response community and will aid emergency responders and policy makers in their short- and long-term interoperability efforts.

Communications interoperability refers to the ability of emergency response agencies to talk across disciplines and jurisdictions via radio communications systems, exchanging voice and/or data with one another on demand, in real time, when needed, and as authorized.

To drive progress along the five elements of the Continuum and improve interoperability, emergency responders should observe the following principles:

- Gain leadership commitment from all disciplines [Emergency Medical Services (EMS), Fire, Law Enforcement].
- Foster collaboration across disciplines (EMS, Fire, Law Enforcement) through leadership support.
- Interface with policy makers to gain leadership commitment and resource support.
- Use interoperability solutions on a regular basis.
- Plan and budget for ongoing updates to systems, procedures, and documentation.
- Ensure collaboration and coordination across all elements [Governance, Standard Operating Procedures (SOPs),Technology, Training and Exercises, Usage].

Making progress in all aspects of interoperability is essential, since the elements are interdependent. Therefore, to gain a true picture of a region's interoperability, progress along all five elements of the Continuum must be considered together. For example, when a region procures new equipment, that region should plan training and conduct exercises to make the best use of that equipment.

Leadership, Planning, and Collaboration

In addition to progression along the five elements of the Continuum, regions should focus on planning, education and outreach, and maintain an awareness of the specific issues and barriers that affect a particular area's movement towards increased interoperability. For example, many regions face difficulties related to political issues and the relationships within and across jurisdictions and disciplines (e.g., EMS, Fire, Law Enforcement). Leadership can help to work through these challenging internal and jurisdictional conflicts as well as set the stage for a region's commitment to the interoperability effort. Additionally, leaders must be willing to commit the time and resources necessary to ensure the success of any interoperability effort. For example, ongoing maintenance and support of the system must be planned for and incorporated into the budget.

Sustainability

Communications interoperability is an ongoing process, not a one-time investment. Once a governing body is set up, it must be prepared to meet on a regular basis, drawing on operational and technical expertise to plan and budget for continual updates to systems, procedures, and training and exercise programs. If regions expect emergency responders to use interoperable equipment on a daily basis, supporting documentation and the installed technology must be well-maintained with a long-term commitment to upgrades and eventual replacement of equipment.

Lastly, an interoperability program should include both short- and long-term solutions. Early successes can help motivate regions to tackle more time-consuming and difficult challenges. It is critical, however, that short-term solutions not inappropriately drive the planning process, but function in support of longer-term improvements.

Interoperability Continuum Elements

Governance

A common governing structure for solving interoperability issues will improve the policies, processes, and procedures of any major project by enhancing communication, coordination, and cooperation, establishing guidelines and principles, and reducing any internal jurisdictional conflicts. This group should consist of local, tribal, state, and Federal entities as well as representatives from all pertinent emergency response disciplines within the identified region. A formal governance structure is critical to the success of interoperability planning.

Individual Agencies Working Independently—A lack of coordination among responding organizations.

Informal Coordination Between Agencies—Loose line level or agency agreements that provide minimal incident interoperability.

Key Multidiscipline Staff Collaboration on a Regular Basis—A number of agencies and disciplines working together in a local area to promote interoperability.

Regional Committee Working with a Statewide Interoperability Committee—Multidisciplinary agencies working together across a region pursuant to formal written agreements as defined within the larger scope of a state plan. Such an arrangement promotes optimal interoperability.

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Governance	Limited Leadership, Planning, and Collaboration Among Areas with Minimal Investment in the Sustainability of Systems and Documentation	**Individual Agencies Working Independently**	**Informal Coordination Between Agencies**	**Key Multidiscipline Staff Collaboration on a Regular Basis**	**Regional Committee Working with a Statewide Interoperability Committee**	High Degree of Leadership, Planning, and Collaboration Among Areas with Commitment to and Investment in Sustainability of Systems and Documentation
Standard Operating Procedures		**Individual Agency SOPs**	**Joint SOPs for Planned Events**	**Joint SOPs for Emergencies**	**Regional Set of Communications SOPs**	**National Incident Management System Integrated SOPs**
Technology		**Swap Radios**	**Gateway**	**Shared Channels**	**Proprietary Shared Systems**	**Standards-based Shared Systems**
Training & Exercises		**General Orientation on Equipment**	**Single Agency Tabletop Exercises for Key Field and Support Staff**	**Multiagency Tabletop Exercises for Key Field and Support Staff**	**Multiagency Full Functional Exercise Involving All Staff**	**Regular Comprehensive Regional Training and Exercises**
Usage		**Planned Events**	**Localized Emergency Incidents**	**Regional Incident Management**	**Daily Use Throughout Region**	

Minimal Level ← Interoperability Continuum → **Optimal Level**

Standard Operating Procedures

Standard operating procedures (SOPs) are formal written guidelines or instructions for incident response. SOPs typically have both operational and technical components.

Individual Agency SOPs—Uncoordinated procedures across agencies that can hinder effective multidiscipline/multiagency response.

Joint SOPs for Planned Events—The development of SOPs for planned events. This typically represents the first phase as agencies begin to work together to develop interoperability.

Joint SOPs for Emergencies—SOPs for emergency level response that are developed as agencies continue to promote interoperability.

Regional Set of Communications SOPs—Region-wide communications SOPs for multiagency/mulitdiscipline/multihazard responses; an integral step towards optimal interoperability.

National Incident Management System Integrated SOPs—Regional SOPs molded to conform to the elements of the National Incident Management System.

Technology

Although technology is a critical tool for improving interoperability, it is not the sole driver of an optimal solution. Success in each of the other elements is essential to its proper use and implementation, and should drive technology procurement.

Technology is highly dependent upon existing infrastructure within a region. Multiple technology solutions may be required to support large events.

Swap Radios—Swapping radios, or maintaining a cache of standby radios, is an age-old solution that is time-consuming, management-intensive, and may only provide limited results due to channel availability.

Gateway—Gateways retransmit across multiple frequency bands providing an interim interoperability solution as agencies move toward shared systems. However, gateways are inefficient in that they require twice as much spectrum because each participating agency must use at least one channel in each band per common talk path, and because they are tailored for communications within the geographic coverage area common to all participating systems.

Shared Channels—Interoperability is promoted when agencies share a common frequency band, air interface (analog or digital), and are able to agree on common channels. However, the general frequency congestion that exists across the United States can place severe restrictions on the number of independent interoperability talk paths available in some bands.

Proprietary Shared Systems and Standards-based Shared Systems—Regional shared systems are the optimal solution to interoperability. While proprietary systems limit the user's choice of product with regard to manufacturer and competitive procurement, standards-based shared systems promote competitive procurement and a wide selection of products to meet specific user needs. With proper planning of the talk group architecture, interoperability is provided as a byproduct of system design, creating an optimal technology solution.

Training & Exercises

Proper training and regular exercises are critical to the implementation and maintenance of a successful interoperability solution.

General Orientation on Equipment—Agencies provide initial orientation to their users with regard to their particular equipment. Multijurisdiction/multiagency operations are often an afterthought to this training, if provided at all.

Single Agency Tabletop for Key Field and Support Staff—Structured tabletop exercises promote planning and identify response gaps. However, single agency activities do not promote interoperability across disciplines and jurisdictions. Additionally, management and supervisory training is critical to promoting routine use of interoperability mechanisms.

Multiagency Tabletop for Key Field and Support Staff—As agencies and disciplines begin working together to develop exercises and provide field training, workable interoperability solutions emerge.

Multiagency Full Functional Exercises Involving All Staff—Once multiagency/multidiscipline plans are developed and practiced at the management and supervisory level, it is then critical that all staff who would eventually be involved in actual implementation receive training and participate in exercises.

Regular Comprehensive Regional Training and Exercises—Optimal interoperability involves equipment familiarization and an introduction to regional/state interoperability at time of hire (or in an academy setting). Success will be assured by regular, comprehensive, and realistic exercises that address potential problems in the region and involve the participation of all personnel.

Despite the best planning and technology preparations, there is always the risk of the unexpected–those critical and unprecedented incidents that require an expert at the helm who can immediately adapt to the situation. Within the Incident Command System (ICS), these specialists are called Communications Unit Leaders. The role of the Communications Unit Leader is a critical function that requires adequate training and cannot be delegated to an individual simply because that person "knows about radios." Rather, the proper training of these individuals is of significant importance to a region's ability to respond to unexpected events, and it should prepare them to manage the communications component of larger interoperability incidents, applying the available technical solutions to the specific operational environment of the event.

Usage

Usage refers to how often interoperable communications technologies are used. Success in this element is contingent upon progress and interplay among the other four elements on the Interoperability Continuum.

Planned Events—Events for which the date and time are known. Examples include athletic events and large conferences/conventions that involve multiple responding agencies.

Localized Emergency Incidents—Emergency events that involve multiple intra-jurisdictional responding agencies. A vehicle collision on an interstate highway is an example of this type of incident.

Regional Incident Management—Routine coordination of responses across a region that include automatic aid fire response as well as response to natural and man-made disasters.

Daily Use Throughout Region—Interoperability systems that are used every day for managing routine as well as emergency incidents. In this optimal solution, users are familiar with the operation of the system and routinely work in concert with one another.

The Department of Homeland Security established the Office for Interoperability and Compatibility (OIC) in 2004 to strengthen and integrate interoperability and compatibility efforts in order to improve local, tribal, state, and Federal emergency response and preparedness. OIC programs and initiatives address critical interoperability and compatibility issues. Priority areas include communications, equipment, training, and other areas as identified.

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